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EXAMINER

MAI, A

ART UNIT

PAPER NUMBER

2814

DATE MAILED:

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

## Office Action Summary

Application No.

09/259,145

Applicant(s)

PAN ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2000.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 25-28 and 31-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25-28 and 31-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some \* c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) \_\_\_\_\_.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

### Attachment(s)

- 14) ☒ Notice of References Cited (PTO-892)
- 15) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.

- 17) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☐ Other: \_\_\_\_\_.

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## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 25, 26 and 31 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tada (U.S. Patent No. 5,545,577).

Tada discloses a pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device as claimed including:

a semiconductor substrate (100) having a first surface and a second surface;

at least one p-well (3) and at least one n-well (2) on the substrate first surface;

at least one p-type area (5) within the at least one n-well;

at least one n-type area (6) within the at least one p-well; and

a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and the at least one n-well on the substrate first surface. (See Fig. 2c and 3a, col. 6, ll. 3-32).

It is well known in the art that a semiconductor substrate has two surfaces.

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With respect to claim 26, the structure of Tada also includes an oxide layer (4) between the substrate first surface and the substantially dopant-free, uninterrupted diffusion barrier layer.

With respect to claim 31, the substantially dopant-free, uninterrupted diffusion barrier layer of Tada is silicon nitride.

2. Claims 33, 34, 37 and 38 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tada '577.

Tada discloses a pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device as claimed including:

a semiconductor substrate (100) having a first surface and a second surface;  
at least one p-well (3) and at least one n-well (2) on the substrate first surface;  
at least one doped area within at least one of the n-well and at least one of the p-well; and

a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one p-well and the at least one n-well on the substrate first surface. (See Fig. 2c and 3a, col. 6, ll. 3-32).

It is well known in the art that a semiconductor substrate has two surfaces.

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With respect to claim 34, the structure of Tada also includes an oxide layer (4) between the substrate first surface and the substantially dopant-free, uninterrupted diffusion barrier layer.

With respect to claim 37, the substantially dopant-free, uninterrupted diffusion barrier layer of Tada includes silicon nitride.

With respect to claim 38, the at least one doped area of Tada comprises an impurity selected from the group consisting of a n-type impurity and a p-type impurity.

3. Claims 39, 40 and 43-45 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tada '577.

Tada discloses a pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device as claimed including:

- a semiconductor substrate (100) having a first surface and a second surface;

- at least one doped area (2/3) on the substrate first surface;

- at least one second, differently doped area (5/6) within the at least one first doped area; and

- a substantially dopant-free, uninterrupted diffusion barrier layer over the at least one first doped area on the substrate first surface. (See Fig. 2c and 3a, col. 6, ll. 3-32).

It is well known in the art that a semiconductor substrate has two surfaces.

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With respect to claim 40, the structure of Tada also includes an oxide layer (4) between the substrate first surface and the substantially dopant-free, uninterrupted diffusion barrier layer.

With respect to claim 43, the substantially dopant-free, uninterrupted diffusion barrier layer of Tada comprises silicon nitride.

With respect to claim 44, the at least one first doped area of Tada comprises a p-type impurity (2) and the at least second, differently doped area comprises an n-type impurity.

With respect to claim 45, the at least one first doped area of Tada comprises an n-type impurity (2) and the at least second, differently doped area comprises a p-type impurity.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 27, 28, 35, 36, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada '577 as applied to claims 25 and 34 above, and further in view of Mathews et al. (U.S. Patent No. 5,837,378).

Tada discloses a device supra but fails to extend the substantially dopant-free, uninterrupted diffusion barrier layer over the substrate second surface.

However, Mathews, in a similar device, discloses extend a substantially dopant-free, uninterrupted barrier layer (154b) over the second surface of substrate (150). (See Fig. 2A, col. 4, l. 63-col. 5, l. 10).

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the barrier layer (154b) over second surface of the substrate (100) of Tada as taught by Mathews because the formation of the substantially dopant-free, uninterrupted diffusion barrier layer on the second surface reduces overall stress on the wafer thus prevent warpage.

5. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tada as applied to claim 25 above, and further in view of Shim et al. (U.S. Patent No. 5,846,596).

Tada discloses a pre-anneal intermediate structure supra but fails to include silicon oxynitride as the material substantially dopant-free, uninterrupted diffusion barrier layer.

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However, Shim, in a similar structure, discloses the oxidation resistant layer (130) including silicon oxynitride (130). (See col. 3, ll.18-20).

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the substantially dopant-free, uninterrupted diffusion barrier layer of Tada using silicon oxynitride (130) as taught by Shim because it has an added advantage of oxidation resistance.

### ***Response to Arguments***

6. Applicant's arguments with respect to claim February 03, 2000 have been considered but are moot in view of the new ground(s) of rejection.

The applicant's argument are directed only to the amended claims. Therefore, a response to the argument is not warranted.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not



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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

*A.M.*

Anh D. Mai  
April 11, 2000

*Olik Chaudhuri*

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